



# Menstrual Cup - 3D Cup

Menstrual cup ready to print

 Difficulté Facile

 Durée 2 heure(s)

 Catégories Bien-être & Santé

 Coût 5 EUR (€)

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## Introduction

The idea is to create a model or process to easily print a customizable menstrual cut for those who need it ,and to fight against menstrual precariousness.

On the same principle it would be possible to print diaphragms.

Not everyone has access to the Internet to buy it online, enough money to buy a ready-made one, a vacuum chamber to mold it and buy silicone.

My idea is to send the model and the tpu filament for example in fablabs and it would be possible to print it quickly.

Anyone can participate in the fablab for example by making a free donation in a box next to the 3D printer, for example.

We will therefore be able to apply this principle in developing countries and in all places where there is a person in need.

It all started on Thingiverse and with @Totdahl who was able to print the prototype and give me feedback on the file. She also posted it on the 3D printing group on Facebook ,which allowed me to get positive as well as negative, disgusted or amused feedback.

Unintentionally they all participated in a discussion about the female body and the taboos it still represents today.

In the meantime I was able to meet @JessicaCL from Mission Control Lab, one of the creators of openfem.org which had as its project to generate open source contraceptive and protection solutions. "cup & diaphragms. As the site is closed and its project abandoned, we are in discussion to find a solution.



## Matériaux

TPU/TPE filament (bio compatible) or silicone

## Outils

3D printer



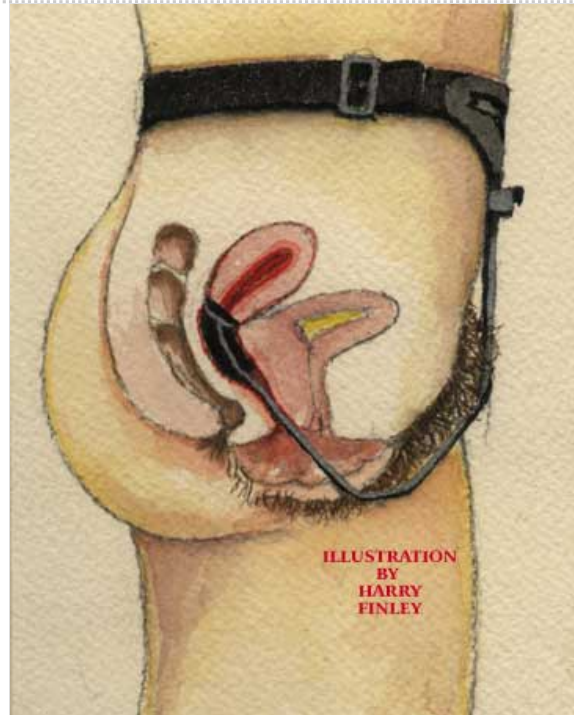
<https://www.thingiverse.com/thing:2958111>

## Étape 1 - What is the cup ?

Menstrual cup patent 1867

I don't need to copy what I found on Wikipedia.

[https://en.wikipedia.org/wiki/Menstrual\\_cup](https://en.wikipedia.org/wiki/Menstrual_cup)



## Étape 2 - Know the project

The purpose of the research is to allow a quick process of healthy printing to avoid having to create a mold with silicone' (*not everyone has the ability to buy this material and does not have access to an inner tube*) and to allow for faster and more personalized production. And to fight against menstrual precariousness.

It would be possible to have an SLA, but it is not yet accessible enough.

This model (*available on Thingiverse in the files section*) 'would allow to customize the size directly, and the shape for those who have specific pathologies (*low neck, vaginism, uterus retroverted*) or **allergies** (so we could change material for those allergic to silicone, the medical TPU being the most appropriate) .

This would allow people who do not have access to sanitary protection (or who make it with the equipment on board) to go to school, work and avoid infections that can cost them their lives. And also to make significant savings (**between 5-8€ /month of protection, purchase of new underwear, pink tax et c.**).

I hope that if this works, some companies will be able to send filament to fablabs and other third places to manufacture them or associations will be able to buy a reel to do a workshop.

This can also be the subject of discussions/discovery workshops around the female body.

I know that this problem is often accompanied by the problem of accessibility to toilets.

I invite you to watch this video and the work of the movement Right To Pee (A movement for free, clean and safe public urinals for women in India, an initiative of CORO India, with many other women's organisations created by Mumtaz Shaikh) and learn more about projects such as Clean Your Cup.

<https://www.youtube.com/watch?v=PTIxexrn1A8&frags=pl%2Cwn>

I leave you articles on the accessibility of hygiene protection in some countries and on the rules in general, as well as interesting articles on the materials I thought I would use.

I invite you to read about it in order to get your own idea of the project.

Feel free if you have any feedback or interesting articles to report to me. "(in English, French or another language)"



## Étape 3 - Questions that remain unanswered for the moment

- Does the TPU/TPE filament correspond to the medical TPU? Is it made of other things or made after other filaments (PLA, ABS...)? Are further tests possible by the companies that manufacture them?
- Does it keep the same properties as the current cups? Can we boil them? Resists it has more than 8 hours in an environment at  $\text{pH} < \text{or} = 5$  without degrading and running the risk of a toxic shock? Do we have the same flexibility (we are looking for a 95A material or similar) ?
- Can they be printed with conventional FDMs just by changing nozzles, or do we need a sterile printer for the medical sector? " (in this case it would increase the production cost and it would be more interesting to buy a cup on the market than to make it, unless customization)"
- Is it possible to have the minimum, see avoid irregularities in the printing to avoid having a bacterial nest? "(by printing slightly warmer and slower for example)"



## Étape 4 - Matériel Safety Data Sheet (MSDS) of TPU98A

Material Safety Data Sheet (MSDS) Fiches que j'ai pu trouver sans demander (Cela reste vaste sur les priorités physiques et chimiques notamment sur le pH )

Chemical stability : Material is stable under normal conditions (quelles sont ces conditions ?)

- Fillamentum Flexfill (TPU) SDS : 92A / 98A
- Prusament 98A meme firme que pour Fillamentum
- Extrudr TPU 98A
- NinjaTek TPU 85A
- KIMYA TPU 92A OWA
- Formfutura Pythonflex 98A
- Recreus Filaflex 95A
- Verbatim TPE A85
- Ultimaker TPU 95A avec enfin une ligne intéressante : Toxicité pour la reproduction--Aucun effet chronique connu
- Polymaker TPU 95A
- ColorFabb NGenFlex TPU 95A (not available for now)
- Grossiste 3D 94A (pas de SDS)
- ICE TPU 98A
- SainSmart TPU 95A (pas de SDS)
- Airwolf3D Wolfbend TPU 87A (indique dans les applications : médical devises)

**Safety Data Sheet**

According to EU Directive 1907/2006, as amended

**Product name: TPU98A**

Date of issue: 23-07-2018

Version: 1.3

**1. Identification of the substance/preparation and of the company****1.1 Trade name:**  
TPU98A**1.2 Use of the product:**  
3DPrinter Filament**1.3 Supplier:****2. Hazards identification****2.1 Classification of the substance or mixture**According to Regulation (EC) No 1272/2008 [CLP]  
No need for classification according to GHS criteria for this product**2.2 Label elements**Globally Harmonized System, EU (GHS)  
The product does not require a hazard warning label in accordance with GHS criteria.

The product does not require a hazard warning label in accordance with EC Directives, the dangerous ingredients are fixed in a polymer matrix.

**2.3 Other hazards**According to Regulation (EC) No 1272/2008 [CLP]  
No specific dangers known, if the regulations/notes for storage and handling are considered.**3. Composition/information on ingredients****3.1. Substances**

Not applicable

**3.2. Mixtures**Polymer based on: polyurethane, stabilizing agents, additives  
Does not contain any hazardous ingredients according to Regulation (EC) No. 1272/2008**4. First aid measures****4.1 Description of first aid measures**On skin contact:  
Burns caused by molten material require hospital treatment.**4.2 Most important symptoms and effects, both acute and delayed**

Symptoms: No significant reaction of the human body to the product known.

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Hazards: No hazards anticipated.

**4.3 Indication of any immediate medical attention and special treatment needed**

Treatment: Treat according to symptoms (decontamination, vital functions), no known specific antidote.

**5. Fire fighting measures****5.1 Extinguishing media**Suitable extinguishing media:  
Water, foam, dry chemical powder, Carbon dioxide fire extinguishers**5.2 Special hazards arising from the substance or mixture**Carbon dioxide, carbon monoxide, hydrogen cyanide, hydrocyanic acid, nitrogen oxides, isocyanate  
The substances/groups of substances mentioned can be released in case of fire.**5.3 Advice for fire fighters**Protective equipment:  
Self contained breathing apparatus (SCBA).  
Further information:  
Dispose of fire debris and contaminated extinguishing water in accordance with official regulations.**6. Accidental release measures****6.1 Personal precautions, protective equipment and emergency procedures**

No special precautions necessary.

**6.2 Environmental precautions**

No special precautions necessary.

**6.3 Methods and materials for containment and cleaning up**

Sweep up and contain spilled material if possible. High risk of slipping.

**6.4 Reference to other sections**

Refer to section (8)

**7. Handling and storage****7.1 Handling**Provide suitable exhaust ventilation at the drying process and in the area surrounding the melt outlet of processing machines.  
Protection against fire and explosion:  
No special precautions necessary.**7.2 Conditions for safe storage, including any incompatibilities**Segregate from foods and animal feeds.  
Suitable materials for containers: High density polyethylene (HDPE), Low density polyethylene (LDPE), paper, board  
Further information on storage conditions: Keep container tightly closed. Protect against moisture.

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### 8. Exposure controls/personal protection

#### 8.1 Control parameters

##### Components with occupational exposure limits

The substances mentioned are contained only in traces in the product.  
101-68-8: 4,4'-Methylenedi(phenyl diisocyanate)

##### PNEC

The obligation to register acc. to the REACH Regulation (EC) No 1907/2006 does not apply to polymers.

##### DNEL

The obligation to register acc. to the REACH Regulation (EC) No 1907/2006 does not apply to polymers.

#### 8.2 Exposure controls

##### Personal protection

Hand protection: not required.

Eye protection: not required.

Respiratory protection: Breathing protection if breathable aerosols/dust are formed.

General safety and hygiene measures

Wearing of closed work clothing is recommended. When using, do not eat, drink or smoke.

Hands and/or face should be washed before breaks and at the end of the shift. At the end of the shift the skin should be cleaned and skin-care agents applied.

### 9. Physical and chemical properties

#### 9.1 Information on basic physical and chemical properties

Appearance	Flexible Solid Filament
Odour	Odourless
Colour	depending on product grade
Odour threshold	Not determined
pH	Not applicable
Softening Temperature	>120 °C
Initial boiling point and boiling range	The product is a non-volatile solid.
Flash point	Not applicable
Evaporation rate	Not applicable
Flammability (solid, gas)	flammable
Upper/lower flammability or explosive limits	For solids not relevant for classification and labelling.
Vapour pressure	Not applicable
Vapour density	Not applicable
Relative density	Ca. 1.1-1.2 g/cm <sup>3</sup> (20 °C)
Bulk density	ca. 600 kg/m <sup>3</sup> as granules
Solubility(ies)	Practically insoluble
Partition coefficient (n-octanol/water)	Not available
Auto-ignition temperature	>400 °C
Decomposition temperature	>230 °C
Viscosity	Not applicable

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Explosive properties	Not explosive
Oxidizing properties	Not oxidizing

### 10. Stability

**10.1 Reactivity:** Stable under normal handling and storage conditions  
Corrosion to metals: No corrosive effect on metal.

**10.2 Chemical stability:** Stable under normal handling and storage conditions

**10.3 Possibility of hazardous reactions:**  
No hazardous reactions observed under normal handling and storage conditions

**10.4 Conditions to avoid**  
While printing, keep away from sparks and open flame. Exposure to elevated temperatures can cause product to decompose.

**10.5 Incompatible materials:**  
None known

**10.6 Hazardous decomposition products**  
Possible decomposition products on thermal decomposition  
carbon monoxide, Carbon dioxide, hydrogen cyanide, hydrocyanic acid  
isocyanates, nitrogen oxides

### 11. Toxicological information

#### 11.1 Information on toxicological effects

##### Acute toxicity:

Assessment of acute toxicity:

Virtually nontoxic after a single skin contact. Virtually nontoxic by inhalation. Virtually nontoxic after a single ingestion.

Experimental/calculated data:

LD50 rat (oral): > 5,000 mg/kg

The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

##### Irritation:

Assessment of irritating effects:

Not irritating to the eyes. Not irritating to the skin. The product has not been tested. The statement has been derived from substances/products of a similar structure or composition.

##### Respiratory/Skin sensitization:

Assessment of sensitization:

The chemical structure does not suggest a sensitizing effect.

##### Germ cell mutagenicity

Assessment of mutagenicity:

The chemical structure does not suggest a specific alert for such an effect.

##### Carcinogenicity

Assessment of carcinogenicity:

The chemical structure does not suggest a specific alert for such an effect.

##### Reproductive toxicity

Assessment of reproduction toxicity:

The chemical structure does not suggest a specific alert for such an effect

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**Developmental toxicity**

Assessment of teratogenicity:

The chemical structure does not suggest a specific alert for such an effect.

Specific target organ toxicity (single exposure)

Assessment of STOT single:

Based on the available information there is no specific target organ toxicity to be expected after a single exposure.

Repeated dose toxicity and Specific target organ toxicity (repeated exposure)

Assessment of repeated dose toxicity:

Repeated exposure to the substance by dermal administration leads to effects similar to those found after single exposure. Repeated exposure to the substance by inhalative administration leads to effects similar to those found after single exposure. Repeated exposure to the substance by oral administration leads to effects similar to those found after single exposure.

Aspiration hazard

No aspiration hazard expected.

**12. Ecological information****12.1 Toxicity**

Not expected to be acutely toxic, but material in pellet or bead form may mechanically cause adverse effects if ingested by waterfowl or aquatic life.

**12.2 Persistence and degradability**Assessment biodegradation and elimination (H<sub>2</sub>O):

Poorly biodegradable.

Elimination information:

Poorly biodegradable.

**12.3 Bio accumulative potential**

To avoid bioaccumulation plastics should not be disposed in the sea or in other water environments.

**12.4 Mobility in soil**

No data available

**12.5 Results of PBT and vPvB assessment**

According to Annex XIII of Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH). The product does not contain a substance fulfilling the PBT (persistent/bioaccumulative/toxic) criteria.

**12.6 Other adverse effects**

The product does not contain substances that are listed in Annex I of Regulation (EC) 2037/2000 on substances that deplete the ozone layer.

**12.7. Additional information**

Adsorbable organically-bound halogen (AOX):

This product contains no organically-bound halogen.

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**13. Disposal considerations****13.1 Waste treatment methods**

Can be used without re-conditioning

May be disposed of or combusted with domestic refuse according to local regulations.

Waste key:

07 02 13 waste plastic

Contaminated packaging:

Completely emptied packagings can be given for recycling.

**14. Transport information**

Product has been classified as being non-dangerous substance according to transport regulations ADR, RID, IMDG, IATA/ICAO

**14.1 UN number**

Not applicable

**14.2 UN proper shipping name**

Not applicable

**14.3 Transport hazard class(es)**

Not applicable

**14.4 Packing Group**

Not applicable

**14.5 Environmental hazards**

No additional data is available

**14.6 Special precautions for user**

No data available

**14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**

Not evaluated

**15. Regulatory information****15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**

If other regulatory information applies that is not already provided elsewhere in this safety data sheet, then it is described in this subsection.

**15.2 Chemical Safety Assessment**

The obligation to register acc. to the REACH Regulation (EC) No 1907/2006 does not apply to polymers.

**16. Other information***Information is referenced from other manufacturers.**For abbreviations and acronyms, see: ECHA Guidance on information requirements and chemical safety assessment, chapter R.20 (Table of terms and abbreviations).**This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006 and Regulation (EC) No. 2015/830. Label element according to Regulation (EC) No 1272/2008.*

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## Étape 5 - Cup is safe ?

<https://www.youtube.com/watch?v=ul6s9khCXHY> (video that gave me the idea to do this project and filament that I plan to use TPU/TPE)

[\(Test for a cup mold\)](http://www.orangenarwhals.com/2015/11/diy-menstrual-cups-hack4fem)

<https://3dprint.com/36851/sexshop3d-safe-sex-toys/> (*How to make sex toy safe*)

<https://www.liveloveluna.com/blogs/news/fda-approved-menstrual-cups-what-does-it-really-mean>

<https://readycontainment.com/wp-content/uploads/2017/11/Cooleys-Chemical-Resistant-Chart.pdf> (TPU chemical resistance chart)

- <https://www.quora.com/How-does-TPU-differ-from-silicone>
- <https://www.quora.com/Is-thermoplastic-polyurethane-TPU-toxic>



## Étape 6 - Accessibility to hygienic protections/menstrual precariousness

- <http://www.leparisien.fr/laparisienne/actualites/societe/tampons-et-serviettes-hygeniques-des-produits-de-luxe-07-05-2018-7703358.php>
- [https://www.youtube.com/watch?time\\_continue=23&v=GXqF9H2aMBw](https://www.youtube.com/watch?time_continue=23&v=GXqF9H2aMBw)



## Étape 7 - Books and articles about menstruations

Le grands mystères des règles by Jack Parker

<https://passionmenstrues.com/author/jackxparker/>

[https://simonae.fr/sante-bien-etre/menstruations/regles\\_dessous\\_protections\\_periodiques\\_adopter/](https://simonae.fr/sante-bien-etre/menstruations/regles_dessous_protections_periodiques_adopter/)

<https://simonae.fr/sante-bien-etre/menstruations/coupe-menstruelle-revolution-silicone-cup-regles/>

<https://cyclique.fr>

<https://putacupinit.com>

